Amendments to the CLAIMS:

Without prejudice, this listing of the claims replaces all prior versions and listings of the claims in the present application:

LISTING OF CLAIMS:

1. (Currently Amended) A decoding method for demodulating a received signal available in serial code concatenation in a code-division multiple access transmission system, a two-step coding being carried out at the transmitting end of the transmission system, the method comprising:

providing a soft-in/soft-out decoder in a receiver of the transmission system, a first decoder step of the soft-in/soft-out decoder including an inner decoder and a Hadamard orthogonal multi-step inner code, a second decoder step of the soft-in/soft-out decoder including an outer decoder and an outer error correcting code of a predefined rate; and

processing soft values as reliability information at an output and an input of the soft-in/soft-out decoder, a soft output of the inner decoder being a soft input for the outer decoder, a channel reliability information output from a preceding demodulation being an input for the inner decoder;

wherein one of the following is satisfied:

(1) a modified soft-decision Viterbi algorithm is used in which reconstruction is performed for coded bits of the outer code, and is not performed for transmitted information bits; and

(2) a maximum a posteriori decoder is used, in which soft information pertaining to calculations of the outer, coded bits is used partially as a priori information for systematic bits of the inner code, so that soft values are fed back to the first decoder.

2. (Original) The method as recited in claim 1 wherein the inner code includes a 32-step modulation.

3. (Original) The method as recited in claim 1 wherein the inner code includes a 64-step modulation.

4. (Original) The method as recited in claim 1 wherein the outer code includes a convolution code.

5. (Original) The method as recited in claim 1 wherein the outer code includes a block code.

6. (Original) The method as recited in claim 1 wherein the reliability information includes L-values.

7. (Original) The method as recited in claim 1 wherein a soft input of the inner decoder includes a-priori information for systematic bits of Walsh functions of the inner code, the a-priori information being useable by the inner decoder for decoding the inner code.

8. (Original) The method as recited in claim 7 wherein the inner decoder includes a maximum a-posteriori decoder.

9. (Original) The method as recited in claim 1 wherein to enhance reliability of decisions of the inner decoder, a soft output of the outer decoder is fed back as a soft input to the inner decoder as a-priori information for systematic bits of Walsh functions of the inner code.

10. (Previously Presented) The method as recited in claim 7 wherein the inner decoder includes a maximum a-posteriori decoder and wherein the a-priori information is made available to the inner decoder as reliability values in an a-priori vector $L(u)$, u being a bit, so that the inner decoder provides L-values for estimated symbols of an inner decoder soft value output vector $L(\hat{u})$, an amount $|L(\hat{u}_k)|$ of the L-values indicating a reliability of a respective decision and an operational sign of the $L(\hat{u}_k)$ representing a hard decision.

11. (Previously Presented) The method as recited in claim 9 wherein the inner decoder includes a maximum a-posteriori decoder and wherein the a-priori information is made available to the inner decoder as reliability values in an a-priori vector $L(u)$, u being a bit, so that the inner decoder provides L-values for estimated symbols of an inner decoder soft value

output vector $L(\hat{u})$, an amount $|L(\hat{u}_k)|$ of the L-values indicating a reliability of a respective decision and an operational sign of the $L(\hat{u}_k)$ representing a hard decision.

12. (Previously Presented) The method as recited in claim 1 wherein the receiver includes a coherent receiver structure, wherein a soft input of the inner decoder includes a-priori information for systematic bits of Walsh functions of the inner code and wherein the inner decoder includes a maximum a-posteriori decoder, the maximum a-posteriori decoder calculating, starting from an input vector $L_C \cdot y$, y being a vector, having a specific reliability L_C and from an a-priori information vector $L(u)$, u being a bit, as a decoder result, a weighted decision including reliability L-values for estimated symbols, the L-values including an extrinsic term $L_e(\hat{u}_k)$.

13. (Previously Presented) The method as recited in claim 1 wherein the receiver includes a coherent receiver structure, wherein a soft input of the inner decoder includes a-priori information for systematic bits of Walsh functions of the inner code, and wherein the inner code includes a Hadamard code, the Hadamard code being decoded by:

adding an a-priori information vector $L(u)$, u being a bit, for systematic bits of a Walsh function of the Hadamard code to an input vector $L_C.y$, y being a vector, from a channel;

performing a fast Hadamard transformation so as to provide a fast Hadamard transform resultant vector w;

then generating exponential functions with $\frac{1}{2} \cdot w_j$ as an argument, w_j being a respective element of the vector w; and

adding, dividing and expressing logarithmically elements of a result vector z for each symbol $\hat{u}_K$ to be decoded according to the equation:

Term 1 Term 2

$$\ln\frac{\sum_{j,u_k=+1}^{N-1} z_j}{\sum_{j,u_k=-1}^{N-1} z_j} = \ln\frac{\sum_{j,u_k=+1}^{N-1} \exp(\frac{1}{2}w_j)}{\sum_{j,u_k=-1}^{N-1} \exp(\frac{1}{2}w_j)} = \ln\left(\sum_{j,u_k=+1}^{N-1} \exp(\frac{1}{2}w_j)\right) - \ln\left(\sum_{j,u_k=-1}^{N-1} \exp(\frac{1}{2}w_j)\right)$$

z_j being a respective element of the resultant vector z, j being a respective vector element index, N being a size of the Walsh functions of the inner code.

14. (Previously Presented) The method as recited in claim 1 wherein a result of the inner decoder for a bit $\hat{u}_k$ includes a-priori information $L(u_k)$, u being a bit, about a bit to be decoded, channel information $L_C \cdot y_{sys(k)}$ about the bit to be decoded, and extrinsic information $L_e(\hat{u}_k)$, channel information and a-priori information on all other bits of a demodulator output vector y or of a transmitted Walsh function of the inner code being included in the extrinsic information $L_e(\hat{u}_k)$.

15. (Previously Presented) The method as recited in claim 1 wherein the receiver includes an incoherent receiver structure and wherein the inner decoder includes a maximum a-posteriori decoder, the maximum a-posteriori decoder calculating, starting from a square-law-combining fast Hadamard transform resultant decision vector w and from an a-priori vector L(u), u being a bit, as a decoder result, a weighted decision including the L-values for estimated symbols, the L-values including an extrinsic term $L_e(\hat{u}_k)$.

16. (Original) The method as recited in claim 1 wherein the receiver includes an incoherent receiver and wherein the outer decoder includes a maximum a-posteriori decoder, the soft output of the inner decoder including a-priori information for systematic bits of Walsh functions of the inner code useable for decoding of the inner code.

17. (Currently Amended) A decoding device for demodulating a received signal available in serial code concatenation in a code-division multiple access transmission system, a two-step coding being carried out at the transmitting end of the transmission system, the device comprising:

a soft-in/soft-out decoder disposed in a receiver of the transmission system, a first decoder step of the soft-in/soft-out decoder including an inner decoder and a Hadamard orthogonal multi-step inner code, a second decoder step of the soft-in/soft-out decoder including an outer decoder and an outer error-correctinge code of a predefined rate, soft values being processed as reliability information at an output and an input of the soft-in/soft-out decoder, a soft output of the inner decoder being a soft input for the outer decoder, a channel reliability information output from a preceding demodulation being an input for the inner decoder;

wherein one of the following is satisfied:

(1) a modified soft-decision Viterbi algorithm is used in which reconstruction is performed for coded bits of the outer code, and is not performed for transmitted information bits; and

(2) a maximum a posteriori decoder is used, in which soft information pertaining to calculations of the outer, coded bits is used partially as a priori information for systematic bits of the inner code, so that soft values are fed back to the first decoder.

18. (Original) The device as recited in claim 17 wherein the inner code includes a 32-step modulation.

19. (Original) The device as recited in claim 17 wherein the inner code includes a 64-step modulation.

20. (Original) The device as recited in claim 17 wherein the outer code includes a convolution code.

21. (Original) The device as recited in claim 17 wherein the outer code includes a block code.

22. (Original) The device as recited in claim 17 wherein the reliability information includes L-values.

23. (Original) The device as recited in claim 17 wherein to enhance reliability of decisions of the inner decoder, a soft output of the outer decoder is fed back as a soft input to the inner decoder as a-priori information for systematic bits of Walsh functions of the inner code.

24. (Original) The device as recited in claim 17 further comprising a RAKE receiver disposed upstream from the inner decoder, an output of the RAKE receiver including the channel reliability information output from the preceding demodulation.

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25. (New) The method or device as recited in claims 1 or 17, wherein using logarithmic likelihood algebra, a maximum a posteriori (MAP) decoder for the inner code is expressed by the following first equation:

$$L^I(\hat{u}_k) = \ln \frac{\sum_{x \in C^I, u_k=+1} P(x|y)}{\sum_{x \in C^I, u_k=-1} P(x|y)} = \ln \frac{\sum_{x \in C^I, u_k=+1} \exp(\frac{1}{2}\sum_{i=0}^{N-1} L(x_i; y_i) \cdot x_i}{\sum_{x \in C^I, u_k=-1} \exp(\frac{1}{2}\sum_{i=0}^{N-1} L(x_i; y_i) \cdot x_i},$$

where the values satisfy the following second equation:

$$L(xi,yi) = \begin{cases} Le \bullet y_i + L^I(Ui);\ for\ i = \frac{1}{2^{k+1}} N; k = 0, \ldots, K-1 \\ Le \bullet y;\ otherwise \end{cases}$$

describe a probability of all elements of the resulting vector.

26. (New) The method or device as recited in claim 25, wherein the probability is supplemented by an input vector y with probability L_c by a-priori information $L^I(u_i)$ for systematic bits according to the first equation of a code word, wherein the arguments of the exponential function in the second equation are results of correlating a resulting vector with all Walsh functions x_j, j= 0, ..., N-1, the correlation operation for all code words x_j being performed by applying a fast Hadamard transformation to provide a correlation vector w'.

27. (New) The method or device as recited in claims 1 or 17, wherein the inner decoder includes a maximum a-posteriori decoder and wherein the a-priori information is made available to the inner decoder as reliability values in an a-priori vector L(u), u being a bit, so that the inner decoder provides L-values for estimated symbols of an inner decoder soft value output vector $L(\hat{u})$, an amount $|L(\hat{u}_k)|$ of the L-values indicating a reliability of a respective decision and an operational sign of the $L(\hat{u}_k)$ representing a hard decision, wherein the decoder result for bit $\hat{u}_K$ includes three terms, including a-priori information $L(u_k)$ about the bit to be decoded, channel information $L_c \cdot y_{sys(k)}$ about the bit to be decoded, and extrinsic information $L_e(\hat{u}k)$, in which channel information and a-priori information on all other bits of vector **y** or of a transmitted Walsh function are represented by the following equation:

$$L(\hat{u}_k) = L(u_k) + L_c \cdot y_{sys(k)} + \underbrace{\ln \frac{\sum_{j=0,u_k=+1}^{N-1} \exp\left(\sum_{i=0,i\neq sys(k)}^{N-1} L(x_i;y_i) \cdot \frac{1}{2} x_i \right)}{\sum_{j=0,u_k=-1}^{N-1} \exp\left(\sum_{i=0,i\neq sys(k)}^{N-1} L(x_i;y_i) \cdot \frac{1}{2} x_i \right)}}_{L_e(\hat{u}_k)}$$